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# Long-term physical, psychological and social consequences of severe injuries

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*This 6 year follow-up study was designed to evaluate the long-term physical, psychological and social outcomes of severely injured patients (Injury Severity Score of  $\geq 16$ ). Patients were treated at the University Hospital Groningen, the Netherlands, between January 1989 and December 1989. Outcomes were assessed using a postal questionnaire. After injury, the 55 respondents had predominantly complaints of the extremities, the spine and the head. Psychological complaints were present in 84 per cent of patients and mainly concerned fatigue, slowness and memory impairments. Despite these physical and psychological complaints, 74 per cent of patients were able to return to work and the majority succeeded in complying with job requirements. Injuries of the extremities and the spine were risk factors for failing to return to work. Social consequences were also reflected in broken marriages (6/22) and changes of leisure activities (45 per cent). On the basis of the impairments and disabilities revealed, we conclude that further improvement of the long-term outcomes of severely injured patients may be achieved by advancements in the treatment of injuries to the head, spine or extremities, comprehensive psychological support and vocational rehabilitation. © 1998 Elsevier Science Ltd. All rights reserved.*

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## Introduction

Injuries are a matter of great concern in present-day western societies. The long-term impact of injuries in terms of mortality is well-known. In the Netherlands, injuries are the fourth leading cause of death in the total population (3.8 per cent) and the leading cause of death among children and young adults (up to 39 years of age)<sup>1</sup>.

Improvements in diagnosis and treatment strategies as well as accident prevention initiatives have led to a decrease of the number of fatalities in recent decades. Consequently, more and more attention is being focused on survivors with residual disabilities.

It is generally assumed that severely injured patients suffer disability after injury, although little is known about the extent and severity of these disabili-

ties<sup>2,3</sup>. Such information is of interest, because severely injured patients are generally young and belong to the working population<sup>4</sup>. Functional limitations in this age group may mean that a person is unable to return to work and will consequently have to make a long-term appeal for social services.

Information on the outcome of severely injured patients is also necessary, because it may help to refine treatments, develop preventive measures and lead to improvement in the prevention and treatment of disabilities. Since most studies on this subject document short-term outcomes and long-term consequences remain largely unexplored<sup>5,6</sup>, this study aims to assess the long-term outcomes of severely injured patients. The severity and the extent of physical, psychological and social consequences of severe injuries will be evaluated.

## Methods

All consecutive severely injured patients admitted to the University Hospital Groningen (UHG) between 1 January 1989 and 31 December 1989 were entered in the study. Patients were over 16 years of age and those with an Abbreviated Injury Scale/Injury Severity Score (AIS/ISS) of equal to or higher than 16 were considered to be severely injured<sup>7–9</sup>. Patients who did not have sufficient command of the Dutch language (orally or in writing), mentally retarded patients and those admitted permanently to a psychiatric institution were excluded.

The UHG (1056 beds) has a level I Trauma Centre and serves the entire northern part of the Netherlands (a region of 1.5 million inhabitants). Data were obtained from the trauma registry of the UHG and from medical charts. Age, sex, mechanism of injury, AIS, ISS and mortality were recorded. Outcome was assessed by a postal questionnaire (sent in 1995, 6 years after injury), which was returned to us anonymously.

Questions concerned the present and pre-injury physical, psychological and social status (employment status, marital status, leisure activities). To assess the

physical and psychological status, we used visual analogue scales (VAS) and checklists for physical and psychological complaints. The checklist concerning physical complaints comprised two separate lists (to assess the physical status before and after injury). The checklist used to measure psychological complaints was made up of 12 statements concerning the most commonly reported cognitive, behavioural and emotional problems after head injury<sup>10-12</sup>. The respondent was asked to indicate whether or not his psychological well-being had been affected by the injury.

The visual analogue scale is a simple, but reliable and valid method to estimate health matters, for example, pain. Patients were asked to mark the intensity of their present pain on a 10-cm line. One end of the line represents no pain at all, while the other end represents maximum pain. The distance between the lower end of the line and the respondent's mark (in mm) reflects the VAS score (scale 0-100)<sup>13,14</sup>.

Statistical analysis was performed using SPSS/PC+5.0. Differences between the means of two continuous variables were determined with Student *t*-test and differences between discrete variables were analysed with Fisher's exact test or with the chi-square test, using Yates's correction for continuity. The McNemar test was used to test the changes in proportions for pairs of dichotomous variables.

## Results

### Study population

During the study period, 121 severely injured patients had been treated at the UHG. Their mean

age was 41 years (range 16-89 years) and 84 were males (69 per cent). Three-quarters of the patients had been injured in traffic accidents ( $n = 92$ , 76 per cent). The mean ISS was 30 (range 16-75). Patients had mostly sustained severe injuries ( $\text{AIS} \geq 3$ ) to the head and neck, chest and extremities (53, 52 and 46 per cent, respectively). Twenty-eight patients (23 per cent) died during hospitalization and another nine patients (7 per cent) died during the follow-up period. Of the remaining 84 survivors, four did not meet the inclusion criteria. Another six could not be traced due to moving house or residence abroad. Ultimately, a postal questionnaire was sent to 74 patients. These patients were comparable with the original study population concerning age and sex (mean age 35 years (NS), 66 per cent male (NS)). The questionnaire was returned by 55 (75 per cent) patients.

### Physical status

Before injury, the severely injured patients generally had few complaints about their physical health (see Figure 1). Six years after injury, 44 (80 per cent) of the patients reported one or more physical complaints. Three-quarters (73 per cent) of them stated that their current physical distress was caused by the initial damage. There was a statistically significant increase in cerebral problems (mainly headaches) ( $P = 0.01$ ) and further predominant problem areas were the extremities and the spine (mostly pain in the cervical region, low back pain and pain in the lower extremities) ( $P = 0.00$  and  $P = 0.00$ , respectively).

Despite the increase in physical complaints after injury, the patients judged their present general health to be good (mean VAS-score 75, SD 22) and

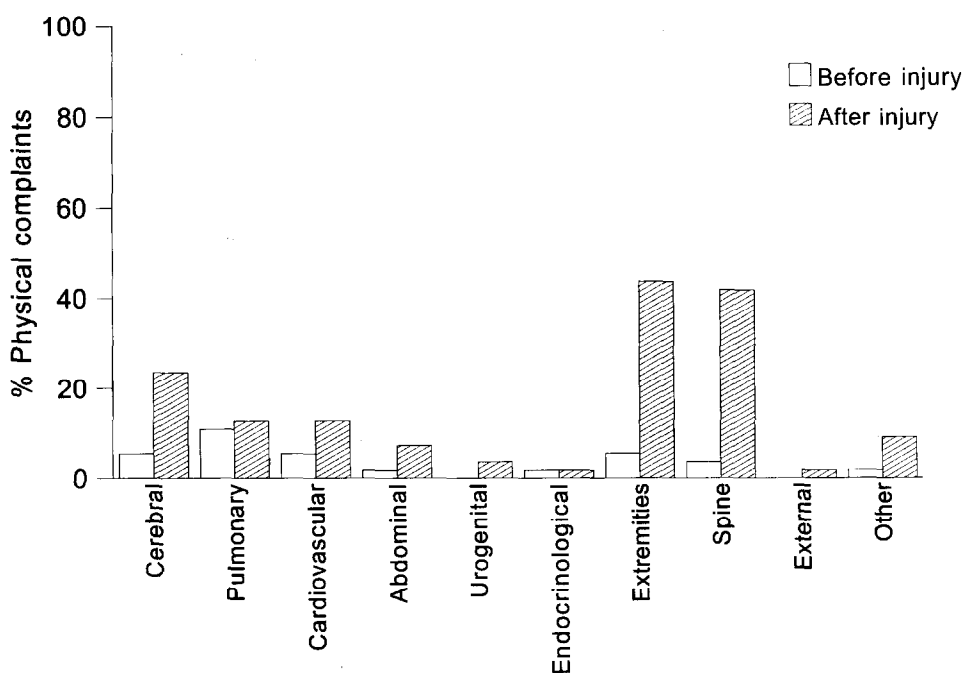


Figure 1. Distribution of physical complaints in body areas before and after injury ( $n = 55$ ).

**Table I.** Percentage of psychological complaints (6 years after injury) due to the initial injury ( $n = 55$ )

	Percentage
Cognitive problems	
Fatigue	49
Memory	46
Slowness	44
Word-finding	42
Concentration	36
Planning	35
Learning	33
Behavioural problems	
Irritable	31
Impulsive	29
Emotional problems	
Depressed	27
Sleep disturbances	26
Anxiety	22

those who suffered pain generally indicated the pain to be mild (mean VAS-score 29, SD 26).

### Psychological status

One or more psychological complaints due to the initial injuries were mentioned by 46 (84 per cent) of patients. Compared with the situation before injury, the patients predominantly felt more fatigued (49 per cent), they judged themselves to be slower (44 per cent) and they mentioned memory impairment (46 per cent). When we subdivided the psychological complaints into three categories (cognitive, behavioural and emotional), it became clear that cognitive problems were causing more distress than the behavioural or emotional ones (see Table I).

### Social status

**Employment status.** At the time of injury, 35 (63 per cent) of patients were employed. Twenty-six of them (74 per cent) were able to return to work an average of 13 months (range 2–36 months) after injury. Among them, five patients (14 per cent) were unable to carry out their former work and had changed their occupation. The majority of patients who returned to work succeeded in complying with job requirements: 21 out of the 26 (81 per cent) patients were still employed at follow-up.

All patients who did not return to work after injury ( $n = 9$ , 26 per cent) received disability benefits. They all mentioned an increase in physical complaints after injury (particularly in the extremities and spine) and they complained particularly about 'fatigue' and 'learning something new' on the mental checklist.

**Marital status.** It was only in a minority of the patients (6/22) that marital status changed due to the injuries and their sequelae. Two patients lost their spouses at the time of the injury, while the other four reported that their relationship had not been able to survive the consequences of the injury.

**Leisure activities.** The injuries sustained and their long-term effects had meant that 25 patients (45 per

cent) could not pursue their main leisure activity after injury. Sporting activities in particular had changed or were no longer being pursued (47 per cent, 8/17).

### Discussion

Although most trauma outcome studies have focused on mortality or factors that influence survival<sup>15,16</sup>, the decreasing mortality rates following injury and the rising cost of trauma care have drawn increasing attention to the consequences of non-fatal injury. Recent trauma literature has mostly documented short-term effects of injuries<sup>5,17,18</sup>. However, as it is known that recovery from severe injuries takes at least 1 year, but may take even longer<sup>4,19</sup>, outcome studies should be designed to measure long-term side-effects. This study reports the frequency of long-term physical, psychological and social consequences in a group of severely injured patients.

Six years after injury, persistent physical problems were predominantly related to the head, the spine and the extremities. Other authors previously reported that persistent medical problems after injury were mainly a consequence of disorders of the neck, back or (lower) extremities<sup>4,20,21</sup>. Furthermore, it is known that impairments in these body areas are particular risk factors for failing to return to work, which makes them important from a social point of view<sup>5,21</sup>. It is obvious that injuries of the spine and the extremities, although they are mostly not life-threatening, deserve close attention of those treating severely injured patients, in order to keep down the degree of disability in the survivors.

Cognitive problems (such as fatigue, poor memory and slowness) were the main psychological complaints. Poor memory and slowness (loss of initiative) are characteristic features after head injury and it is not surprising that the severely injured patients still had such psychological complaints. Fatigue has also been described as a persistent and disabling feature in head injury<sup>12</sup>. Persistent pain in the extremities or the spine may also form an explanation for the chronic fatigue.

Our results imply that psychological problems tend to persist for much longer than physical ones (the consequences of injuries to the head, spine and the extremities excepted). We can conclude from this that rehabilitation treatment should focus more extensively on the psychological aspects of the injury and that such professional support may need to continue for a considerable length of time.

The percentage of patients who returned to work (74 per cent) was comparable with the results previously described by others (72–81 per cent return to work in severely injured populations)<sup>3,15,22</sup>. MacKenzie et al. previously showed that extremity, spinal cord and head injury patients are high-risk groups for return to work<sup>5</sup>. In our study group, injuries to the extremities and spinal cord were also risk factors. The role and the impact of head injuries in our series was not clear, because 'fatigue' and

'learning' were the only psychological complaints that distinguished those who returned to work from those who did not.

A promising result, especially from an employer's point of view, is the observation that once the injured patients had returned to work, the majority were able to retain their position over time. With that, we can refute the common consensus that the majority of severely injured patients do not return to work or that return to work is doomed to fail. Patients returned to work an average of 13 months after injury. The maximum duration until the patients actually resumed work was three years after injury. For employers this means that they may be optimistic regarding the chance of their employee returning to work, but they should take into account that there may be a considerable time of absence. Previously, it has been demonstrated that from an occupational point of view, recovery is not dependent on physical aspects alone. Factors such as age, education, motivation, behavioural problems and the application of vocational rehabilitation also influence a complex outcome, such as return to work<sup>6,21,23-25</sup>. Although vocational rehabilitation was still in its infancy in our region during the study period, we believe that such treatments might increase the proportion of patients that resume their work and shorten the time it takes. Such treatments might also influence a person's satisfaction with his employment after injury, which is very important in terms of the social outcome.

Social outcome is further reflected by the proportion of patients who are able to follow their previous leisure-time pursuits and the percentage of broken marriages owing to the injury and its consequences. In our series, a certain amount of social disability was found, especially concerning leisure activities.

We acknowledge that the present study has some limitations. For privacy reasons, the questionnaires were returned anonymously, which precluded a comparison between respondents and non-respondents. We are aware that this might have affected the results (response bias).

This study has further limitations in that patients may have forgotten their true premorbid conditions 6 years after the incident (recall bias). Furthermore, the study was conducted in retrospect, whereas a prospective study probably would have resulted in more accurate information. However, even with these limitations in mind, this study reveals interesting long-term outcome data, which may contribute to improving treatment for injured patients.

In summary, our findings confirm the long-term impact of severe injuries on the 'impairment' level of the WHO's ICDH (i.e. physical and psychological complaints).<sup>\*</sup> The consequences on the 'disability' level seem to be acceptable (return to work, changes

in leisure activities and marital status), although improvements in the outcomes of severely injured patients are still desired. Our results make clear that such improvements can probably be achieved by further advancements in the treatment of injuries to the head, spine and extremities, extensive psychological support and vocational rehabilitation.

Disabilities in social terms also reflect the 'handicap' level of the ICDH to a certain extent. The 'handicap' level mainly concerns the quality of life, which for the greater part was beyond the scope of the present study, but should not be disregarded. In future, an optimal quality of life for severely injured patients should become one of the most important aims of those who treat severely injured patients. The present study can be used as a frame of reference on which quality of life studies might be designed.

## References

- 1 Statistics Netherlands, *Vademecum of Health Statistics of the Netherlands 1995*. SDU/Publishers, the Hague, 1995.
- 2 Bull J. P. Disabilities caused by road traffic accidents and their relation to severity scores. *Accident Analysis and Prevention* 1985; **17**: 387.
- 3 Frutiger A., Ryf C., Bilat C., Rosso R., Furrer M., Cantieni R. et al. Five years' follow-up of severely injured ICU patients. *Journal of Trauma* 1991; **31**: 1216.
- 4 Sluis C. K. van der, Duis H. J. ten and Geertzen J. H. B. Multiple injuries: an overview of the outcome. *Journal of Trauma: Injury, Infection, and Critical Care* 1995; **38**: 681.
- 5 MacKenzie E. J., Shapiro S., Smith R. T., Siegel J. H., Moody M. and Pitt A. Factors influencing return to work following hospitalization for traumatic injury. *American Journal of Public Health* 1987; **77**: 329.
- 6 MacKenzie E. J., Cushing B. M., Jurkovich G. J., Morris J. A., Burgess A. R., deLateur B. J. et al. Physical impairment and functional outcomes six months after severe lower extremity fractures. *Journal of Trauma* 1993; **34**: 528.
- 7 Baker S. P., O'Neill B., Haddon W. Jr. and Long W. B. The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. *Journal of Trauma* 1974; **14**: 187.
- 8 American Association for Automotive Medicine. *The Abbreviated Injury Scale, 1985 Revision*. Des Plaines, Illinois, The Association, 1985.
- 9 Goris R. J. A. The injury severity score. *World Journal of Surgery* 1983; **8**: 12.
- 10 Oddy M., Humphrey M. and Uttley D. Subjective impairment and social recovery after closed head injury. *Journal of Neurology, Neurosurgery and Psychiatry* 1978; **41**: 611.
- 11 Brooks D. N. and McKinlay W. Personality and behavioural change after severe blunt head injury — a relative's view. *Journal of Neurology, Neurosurgery and Psychiatry* 1983; **46**: 336.
- 12 Ponsford J. L., Olver J. H. and Curran C. A profile of outcome: 2 years after traumatic brain injury. *Brain Injury* 1995; **9**: 1.

\*Impairments are abnormalities of structure and function on an organ level, whereas disabilities refer to activity restrictions on a personal level. The 'handicap' level concerns social disadvantages as a consequence of disease or disability<sup>26</sup>.

- 13 Scott J. and Huskisson E. C. Vertical or horizontal visual analogue scales. *Annals of the Rheumatic Diseases* 1979; **38**: 560.
- 14 Downie W. W., Leatnam P. A., Rhind V. M., Wright V., Branco J. A. and Anderson J. A. Studies with pain rating scales. *Annals of the Rheumatic Diseases* 1978; **37**: 378.
- 15 Kivioja A. H., Myllynen P. J. and Rokkanen P. U. Is the treatment of the most severe multiply injured patients worth the effort? — a follow-up examination 5 to 20 years after severe multiple injury. *Journal of Trauma* 1990; **30**: 480.
- 16 Lauwers L. F., Rosseel P., Roelants A., Beeckman C. and Baute L. A retrospective study of 130 consecutive multiple trauma patients in an intensive care unit. *Intensive Care Medicine* 1986; **12**: 296.
- 17 Lyle D. M., Quine S., Pierce J. P. and Thomson P. C. Outcome following physical trauma: a comparative approach. *International Disability Studies* 1991; **12**: 113.
- 18 Holbrook T. L., Hoyt D. B., Anderson J. P., Holingsworth-Fridlund P. and Shackford S. R. Functional limitation after major trauma: a more sensitive assessment using the quality of well-being scale — the trauma recovery pilot project. *Journal of Trauma* 1994; **36**: 74.
- 19 Ponsford J. L., Olver J. H., Curran C. and Ng K. Prediction of employment status 2 years after traumatic brain injury. *Brain Injury* 1995; **9**: 11.
- 20 Larsson T. J. and Björnstig U. Persistent medical problems and permanent impairment five years after occupational injury. *Scandinavian Journal of Social Medicine* 1995; **23**: 121.
- 21 Tate D. G. Workers' disability and return to work. *American Journal of Physical Medicine and Rehabilitation* 1992; **71**: 92.
- 22 Rhodes M., Aronson J., Moerkirk G. and Petrash E. Quality of life after the trauma center. *Journal of Trauma* 1988; **28**: 931.
- 23 Cornes P. Return to work of road accident victims claiming compensation for personal injury. *Injury* 1992; **23**: 256.
- 24 Riipinen M., Hurri H. and Alaranta H. Evaluating the outcome of vocational rehabilitation. *Scandinavian Journal of Rehabilitation Medicine* 1994; **26**: 103.
- 25 Morris J. A., Sanchez A. A., Bass S. M. and MacKenzie E. J. Trauma patients return to productivity. *Journal of Trauma* 1991; **31**: 827.
- 26 World Health Organization. *International Classification of Impairments, Disabilities, and Handicaps*. Geneva, WHO, 1980.

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